HOLOPHANE DEVELOPMENTS FOR TYPE C LAMPS

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HOLOPHANE GLASS CO., Inc.
340 Madison Avenue
New York

Works: NEWARK, OHIO

To The Trade

¶ This book is published for the purpose of acquainting the Dealer with the developments which have been made in the Holophane System of Illumination, particularly with reference to units for Type C Lamps.

¶ It is written in an understandable style that is free from technicalities. Familiarize yourself with its contents and you will be in a position to speak with authority on important lighting installations of many types, with a corresponding increase in your prestige and profits.

¶ There is an exclusive advantage in selling Holophane Units — the Holophane System is the one system of illumination based on absolutely scientific principles. Holophane units are designed (1) to direct the light where it is wanted, and (2) to give the maximum light at a minimum cost. These two powerful selling arguments place the Holophane System in an impregnable position. You can profit by these conditions if you will.

HOLOPHANE GLASS CO., Inc.

Holophane Developments for Type C Lamps

THE success of the Holophane System of Illumination is due to two things. First, it is based on the fundamental principles of light control to produce in the most efficient manner correct conditions for good vision. Second, it has always kept pace with lamp improvements, thereby insuring the highest degree of efficiency from successive types of lamps as they were placed on the market.

When the Type B lamp first made its appearance several years ago, the Holophane Company engineers immediately started to evolve a new type of unit, designed to secure the best results from that particular lamp. Today, with the advent of the Type C lamp, they have been equally prompt to meet the situation with a new line of units which rendered the efficiency higher than before. The Type C lamp represents the highest development of the incandescent filament and will undoubtedly maintain its position of supremacy for many years to come. Its advantages are obvious, it gives more light for the same current consumption than the older types, and as the filament is more compactly supported, is less liable to injury than a long filament. This concentration also makes it possible for Holophane units to give a more perfect control of light than with the long-type filaments, as may be readily understood by referring to the diagrams, figures 1 and 2.

Effect of Filament Length on Prisms.

All the fundamental calculations in light are based on the assumption of a "point" light source so that all the light reaching any surface under consideration comes from one direction only. This assumption can never be met in practice as all light sources have some size and light may reach the same point from parts of the filament, for instance, an inch or more apart. Allowances must then be made to take care of the filament length. This was done in the Holophane line by changing the shape of the prisms. While it does not appear to the naked eye the contour of the prisms change from point to point to compensate for this length. This accounts for the superiority of Holophane over imitation reflectors. They could not get the exact curves.

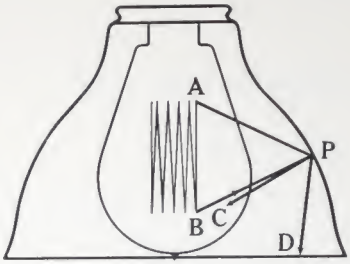


Fig. 1. Effect of using a Type "B" lamp with a reflector designed for a "point source." The light from "A" striking "P" is reflected in the direction "D." This illustrates how the light is spread out.

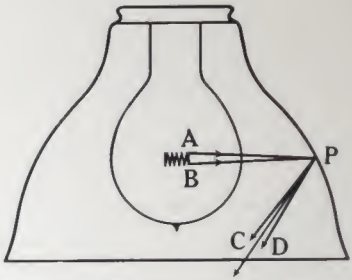


Fig. 2. With the type "C" lamp the concentrated filament approximates more closely a "point source." Note that, "A" and "B" being closer together, the spread of the beam "C D" is less. The prisms of the Superficiency line compensate for this spread.

Fig. 1 shows the results that are obtained from a type B lamp. The light from the top of the filament (A) strikes the surface at (P) and is reflected in the direction (D), while the light from the bottom of the filament (B) striking the same point (P) is reflected in the direction (C), with intermediate results for all other parts of the filament. That is, instead of having the light all reflected in one direction it would be spread in all directions. By proper design this was overcome to a large degree in the Xtra-ficiency line, though with the type C lamp such modifications of design were unnecessary, as Fig. 2 shows, with a resulting higher efficiency.

Referring to diagram Fig. 2, the distance from the top to bottom of the filament is not so great, the light comes more nearly from a point and less change in the shape of the simple prism is necessary to properly direct the light. This means less compromise and a higher efficiency.

Importance of Proper Lamps.

The lamp for which a reflector is designed should always be used as otherwise the filament will not be at the focal point of the reflector and the best results will not be obtained.

To appreciate the importance of attention to this it is only necessary to notice installations in which large lamps have been put in small reflectors in which the filament is entirely exposed. Such conditions result in waste and act against the reputation of Holophane units. Impress on the customer the importance of proper lamps.

Importance of Correct Holders.

Holophane reflectors are designed to produce the best results when the lamp is at a fixed position in the unit. The use of the holder specified insures this proper position. Using the wrong holder not only reduces the amount of light—increasing the cost—or wasting money—but often allows the lamp to stick out of the reflector looking unsightly and causing glare.

The right holder costs no more than the wrong. Be sure that it is installed. Complaints are often due to neglect of this.

Eliminating the Glare.

While with the Type C lamp it is possible to secure higher efficiency and better control, it has the undeniable disadvantage of producing a light of intense brilliancy. So strong is this glare from the Type C lamp that it should never be used bare. When housed in an ordinary reflector of the open type it becomes a positive menace to the sight.

In Holophane units of the open variety the glare of the Type C lamp has been reduced to a minimum by an elongation of the neck

Fig. 3. Micro-photograph of the satin finish showing the coarseness of the grain.

Fig. 4. Micro-photograph of the Holophane Velvet finish showing that the surface is more homogeneous.

of the unit. This brings the lamp farther in the reflector and forms a deep shield, so that the filament is not visible except from almost directly underneath the unit.

All Holophane units for Type C lamps, whether open or closed, are specially etched on the inner surface in order to reduce the brilliance

of both the transmitted and reflected light. The etched surfaces not only act as an eye protection but perform the very vital function of distributing the light rays. This is another important talking point to keep in mind when explaining the superiority of the Holophane System, for no matter how powerful a lamp may be in itself, it does not reach its full value as an illuminant unless the light from it is properly diffused—and Holophane units are the only units scientifically designed to adequately and agreeably diffuse the light of the type C lamp, without sacrificing the greater portion or all of the initial increase in lamp efficiency.

The etched surface on the inside of Holophane units for use with type C lamps affords another example of the thoroughness of Holophane methods in the endeavor to obtain highest efficiency. Our older type units are etched by a process that produces the so-called satin finish, a highly magnified section of which is shown in Fig. 3.

We were not satisfied with the results that this finish gave with type C lamps, so developed a special process for making what we call a "Velvet Finish." This finish, magnified the same as the Satin finish, is illustrated in Fig. 4. Although these two surfaces are practically the same to the naked eye they are in reality very different, as is apparent from the micro-photographs. This difference is equally marked in the results obtained from the two surfaces, the fine grain of the Holophane Velvet finish rendering it possible to secure a far greater degree of reflecting efficiency and softness with type C lamps than could be obtained with any other finish.

Types of Holophane Units Designed for Type C Lamps.

For use with Type C lamps we have made radical changes in three standard forms of Holophane units, each of which has its particular advantages and uses. These units which are described in detail later on, are:

HOLOPHANE OPEN UNITS (Reflectors)
HOLOPHANE SEMI-ENCLOSING UNITS (Reflector-Refractors)
HOLOPHANE ENCLOSING UNITS (Realites)

We will discuss these types in the order named.

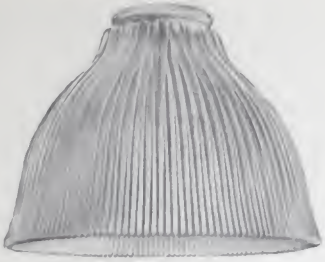


Fig 5 Holophane Super-ficiency reflector. Extensive type made for 75, 100, 200 and 500-watt type "C" lamps.

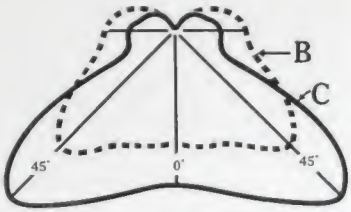


Fig. 6. Typical light distribution of the Holophane Super-ficiency reflector, Extensive type. Curve "C" shows result with the type "C" lamp as compared with the type "B" lamp with the Xtra-ficiency line.

Fig. 7. Holophane Super-ficiency reflector, Intensive type made for 75, 100, 200 and 500-watt type "C" lamps.

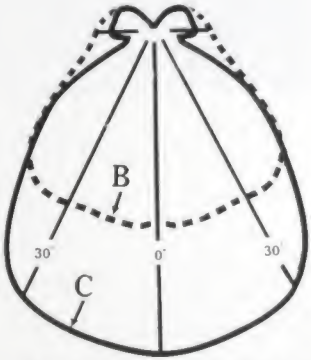
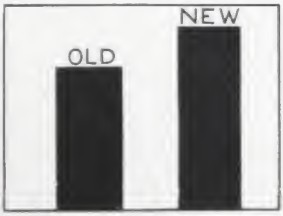


Fig. 8. Typical light distribution of the Super-ficiency reflector, Intensive type. Curve "C" shows result with the type "C" lamp as compared with the type "B" lamp with the Xtra-ficiency line.



Figs. 9 and 10. Heights of diagrams represent the reflecting efficiency of the old line, using type "B" lamps as compared with the new Super-ficiency line using "C" lamps. Diagram at the right for extensive reflectors, and on the left for intensive reflectors.

Fig. 11. Typical store interior lighted by Holophane Super-ficiency reflector. McCreery's rug department, Pittsburgh, Pa.

HOLOPHANE OPEN UNITS.

Super-ficiency Reflectors

Up to the time when Type C Lamps made their appearance, Type B lamps fitted with Holophane Xtra-ficiency Reflectors were acknowledged to be the best lighting units of their kind in existence. As previously noted, Type C lamps, marking a distinct advance in lamp construction, called for certain radical changes in design. These changes are met in Holophane Super-ficiency reflectors, which, fitted with Type C lamps, now become the leaders.

New Features.

By redesigning the Xtra-ficiency Reflector several new and important features have been added. They are:—

Improved appearance, due to the new plain instead of old crimped edge.

Better diffusion, as the result of the new velvet finish instead of clear or satin finish glass.

Eye protection by reason of a lower cut-off, shielding the brilliant light source.

And—**more light due to improved design.**

A glance at Figures 6 and 8 will demonstrate conclusively the great improvement effected on the design of the Super-ficiency Type over the Xtra-ficiency.

Where to Use Holophane Super-ficiency Reflectors.

This unit should be recommended in any installation where a saving of current is an important factor. You can back it with the positive assertion that it will give a maximum amount of illumination for each watt of current consumed. It is also **the** unit to use where highest efficiency with well diffused light is essential.

The list of installations in which the Super-ficiency reflector can be used to best advantage include stores, industrial plants, business offices, hotels, railroad stations, public buildings, schools, institutions, libraries, etc.

How to Use Holophane Super-ficiency Reflectors.

This reflector when properly placed gives uniform illumination over the space to be lighted. Two types of distribution are to be considered:

The **Extensive Type** (CSE) where the units are spaced approximately twice the mounting height.

The **Intensive Type** (CSI) where the units are spaced from 1 to 1½ times the mounting height.

NOTE: Full directions and chart for installing Super-ficiency reflectors are given on page 16.

Super-ficiency Reflectors—Dimensions and Prices.

Extensive Type.

Holophane No.	Dimensions in Inches: Diam. Inches	Dimensions in Inches: Height Inches	*Holder	Recommended Type C Lamp Watts	Number in Standard Package	Approx. Shipping Weight Standard Pkg.	†Net Packing Charge for Standard Pkg.	List Price Each
CSE— 75 V.F.	7½	5⅞	2¼ O	75	10	35	$0.42	**$1.40**
CSE—100 V.F.	8⅛	6	2¼ H	100	10	37	.45	**1.75**
CSE—200 V.F.	9⅞	7⅜	3¼ A	200	10	62	.60	**3.40**
CSE—500 V.F.	13¼	8⅝	3¼	400-500	4	54	.65	**9.85**

Intensive Type.

CSI— 75 V.F.	8	5⅞	2¼ O	75	10	35	$0.42	**$1.40**
CSI—100 V.F.	8⅝	6⅛	2¼ H	100	10	37	.45	**1.75**
CSI—200 V.F.	10¼	7⅜	3¼ A	200	10	60	.60	**3.40**
CSI—500 V.F.	14⅛	8½	3¼	400-500	4	55	.65	**9.85**

Key: C, Type of Lamp; S, Super-ficiency Reflector; E, Extensive Type; I, Intensive Type; V.F., Velvet Finish.

All Super-ficiency reflectors are furnished plain edge. Crimped edge will be furnished on special request only—without extra charge.

*It is imperative that proper holders be used with Holophane Glassware. Any deviation from the above specifications changes the relative position of light source and reflecting surface, with a consequent change in the light distribution producing unsatisfactory results.

†Packing on orders for other than standard package quantities will be charged extra, at cost.

Shipments F.O.B. Newark, Ohio.

Fig. 12. A successfully lighted window where the Holophone No. 983 reflectors are hidden by a valance.

WINDOW LIGHTING REFLECTORS.

One of the biggest sources of profit to the dealer is the sale of proper lighting units for the store window. Among large and small stores alike there is an ever-growing realization of the vital importance of efficient window lighting. Merchants of all classes know that it is not sufficient to merely dress their windows tastefully with attractive goods. They must go a step further. They must light their windows in a way that will show their trims to advantage. A good trim, adequately illuminated is a powerful trade magnet.

Awakening Interest in the Prospect.

In spite of the many campaigns that have been conducted to educate the merchant to the value of good window lighting an astonishingly large number of store windows in every community are today poorly illuminated. This condition opens up to the dealer a field of enormous scope. Many store keepers who fully appreciate the importance of good window lighting, through mental inertia, fail to act. An appeal to this class of prospects—some of whom may possibly be numbered among your regular customers in other lines—often creates an immediate interest, resulting in profitable business.

What Constitutes Good Window Lighting?

The first requisite of good window lighting is that it shall light the goods—not the sidewalk and pedestrians. It should come from a concealed source, so that the observer is conscious only of the effect of the light on the display. The illuminant itself should be self-effacing. Windows lighted with lamps of blinding brilliance make it more difficult to see the goods, and at the same time convey an idea of cheapness.

Another important item in window lighting is the **quality** of the illumination—it should show the goods in their natural colors.

Economy of installation and maintenance are also matters of the utmost importance.

No lighting unit at the present time so fully answers the above requirements as Holophane No. 983 in connection with the Type C 100-watt lamp.

The photometric curve, C, Figure 14 shows how well No. 983 has been designed to direct the light on the window display. Absolutely no light is wasted on the sidewalk. The prisms of this unit are the exact size and proportion for the Type C lamp, and are so constructed as to catch and reflect the most light. In explaining the merits of No. 983 you can therefore dwell on the subject of current economy.

No. 983 is the only highly efficient reflector with which Type C2 "daylight" lamps can be used without changing the color value of the light. The use of the "blue bulb" lamp enhances the attractiveness of any window display by showing the goods more nearly as they appear in daylight.

Fig. 13. No. 983 Window Lighting reflector for use with the 75 and 100-watt type "C" lamps, in the average window.

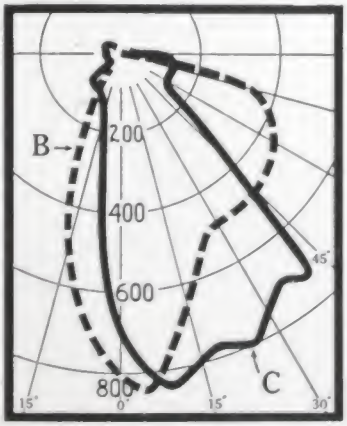


Fig. 14. Full line curve (C) shows the distribution of light from the 983 reflector with 100-watt clear type "C" lamp. The dotted curve (B) is the result from the same lamp in a mirrored reflector.

Another big advantage of the Holophane 983 is that it provides a moderate amount of light for brightening up the top of the windows and the valance. This light is clear gain as with opaque reflectors it is absorbed. Reflectors of the opaque type are practically of no value for valance lighting, as they do not furnish sufficient illumination in upward directions. When so used they have to be supplemented with extra lamps which cause an unpleasant spottiness in the valance.

Mirrored lighting units are subject to deterioration from the intense heat generated by the Type C lamp, a fault from which 983 is free, because its reflecting surface is of clear glass which is not affected by heat.

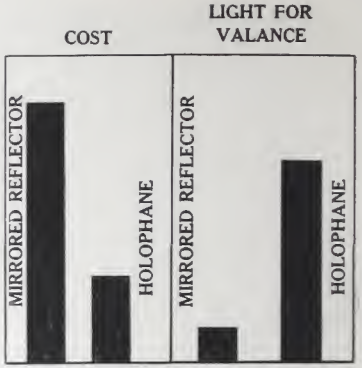


Fig 15. The heights of the figures represent the cost of lighting a window to the same intensity with a mirrored reflector and with a Holophane reflector. Note that with a mirrored reflector the cost is about twice as much as with the Holophane. The second diagram shows that with Holophane reflectors there is over five times the light for valance lighting as with mirrored reflectors. This light is in addition to the downward light.

The smooth, open, prismatic surfaces of 983 render it easy to clean. The superiority of 983 over all other forms of reflectors for window lighting is so apparent that price is no obstacle when you are confronted by a would-be competitive unit. With all its advantages, 983 can be installed, including lamp and holder, at approximately the

Fig. 16. No. 963. Window Lighting reflector for use with the 75 and 100-watt type "C" lamp. No. 8300 is the same as No. 963 except that the edge is crimped. These are designed for high narrow windows.

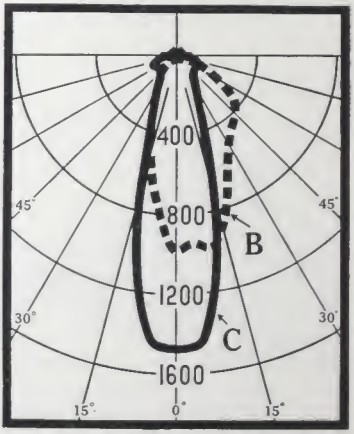


Fig. 17. The full line curve (C) is the result obtained from Holophane 963 with a 100-watt clear type "C" lamp as compared with the result (dotted curve B) secured with a mirrored reflector using the same size of lamp.

Fig. 17A. Holophane No. 922 Window Lighting Reflectors are used in this window, awarded the first prize in "Model Lighting Block," New York City, April 1917.

New Development for Exposed Lamps.

The construction of some windows makes it impossible to entirely conceal the reflectors by a valance or otherwise, as in corner or island windows and with the old type reflectors, no matter where you stand some of the bare lamp filaments strike the eye. This produces very annoying conditions and in extreme cases objectionable glare thus greatly reducing the ability to see the goods displayed.

The new Holophane No. 922 has just been developed to overcome this difficulty. A prismatic refracting plate has been placed over the opening of the reflector that shields the bare filament from the eye without sacraficing the light, for it shields by deflecting the "glare light" down into the window, increasing the light on the goods instead of blinding the eye.

The No. 922 consists of a special asymmetric prismatic reflector with an annular prismatic plate over the front half of the opening. This plate is held on by a U-shaped steel band that engages a flange on half the circumference of the reflector and the entire edge of the plate. The edge of the reflector is recessed so that the plate has a positive position. The assembling is extremely simple; the ring is fitted to the plate, placed in position and sprung over the flange of reflector. Sufficient room is provided for inserting the lamp without removing the plate.

The No. 922 is designed for use with the 100-watt type C or C-2 lamp but it is imperative that the correct holder be used to get the proper results—the 2½ in. form "H."

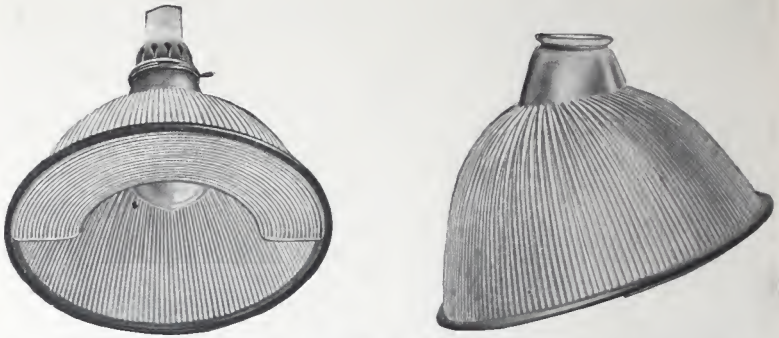


Fig. 17B. Front and side views of the Holophane No. 922. Note that the refracting plate effectively screens the lamp filament. Designed for use with the 100-watt, C or C-2 lamp.

Tests show that this is the most efficient window lighting reflector available, see curve Fig. 17C, and that practically all the light is emitted in directions that will light the goods.

The No. 922 should be used in island, corner, open and mirror backed windows, at narrow entrances and all exposed windows where you want to get the light on the display and not on the pavement or in the eyes of prospective customers. The same data and charts can be used as for installing No. 983. See page 14.

Like the other types of Holophane Reflectors the No. 922 gives especially good results with the C-2 "daylight" lamp, as the crystal glass does not distort the color values. This as well as the fact that a small amount of light is emitted above the horizontal for uniform valance lighting, is well to keep in mind when specifying window reflectors.

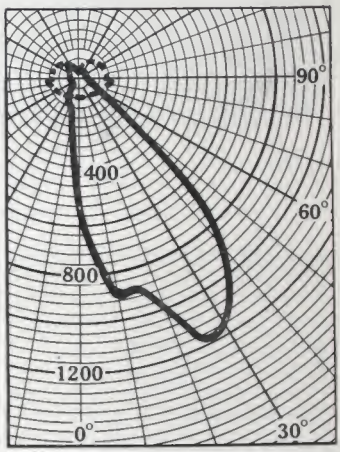


Fig. 17C. Distribution curve of No. 922, in main plane, with 100-watt clear type C lamp. The dotted curve is of the bare lamp.

No. 922 Window Lighting Reflector—Dimensions and Price.

Holophane No.	Dimensions in Inches			Recommended Type C or C-2 Lamp Watts	Number in Standard Package	Approx. Shipping Weight Standard Pkg.	†Net Packing Charge for Standard Pkg.	List Price Each
	Diameter	Height	*Holder					
922	10	6⅞	2¼ H	100	10	65	$.60	$3.50

* It is imperative that proper holders be used with Holophane Glassware.

† Packing on orders for other than standard package quantities will be charged extra, at cost.

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May 15, 1917.

Fig. 18. An even lighting of the valance is as necessary as good light on the display to produce good results. Holophane reflectors give these results.

Fig. 19. A transparency at the top of the window becomes a valuable advertising asset when Holophane reflectors are used. The light is evenly distributed.

same price as the consumer would have to pay for a fairly efficient opaque window reflector without lamp and holder equipment.

The Nos. 963 and 8300 reflectors are designed for use in windows with particularly high ceilings. Their construction is such that even when raised to a considerable height, the light is confined within the window.

Figure 17, page 12, illustrates the superior illuminating power of 963 and 8300 compared with mirrored reflectors.

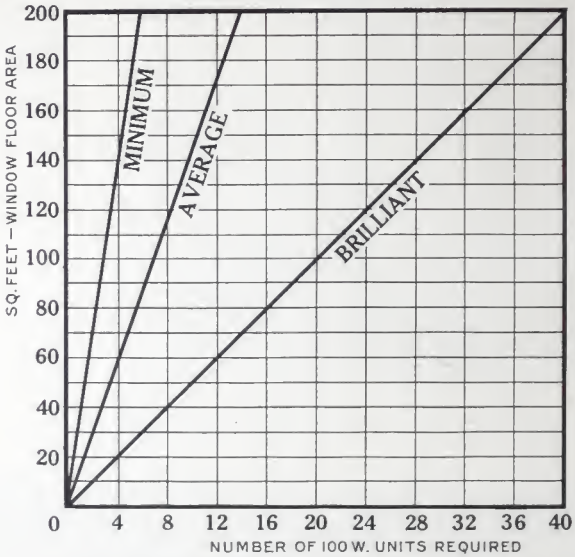

Fig. 20. Chart for determining the number of 100-watt units required to light a show window.

To Determine How Many Lamps and Reflectors are Required.

Multiply the length of the window by the depth to get the square feet of floor space. Locate the corresponding area on the vertical scale at left of chart. Follow the line to the right until it intersects diagonal line indicating minimum, average or brilliant illumination, according to the intensity required by the nature of the goods. Then follow the nearest vertical line down, and the number of 100-watt lamps is given on the horizontal scale.

Example. If a window is 12 feet long by 10 feet deep the area will be 120 square feet. Locate 120 on vertical line at left of chart. Assuming that "Average Illumination" is the proper lighting for a window of this area, continue along the horizontal line at 120 to the point where it intersects the line marked "Average". From this point locate the **nearest** vertical line and follow same downward to get the number of lamps, which in this case is 8 100-watt C lamps.

This chart is based on an average for each square foot of floor space of minimum 2.85 watts, average 6.66 watts and brilliant 20.0

watts. Units should be spaced at equal distances, not exceeding two feet from center to center of outlets.

When using this chart for Type C2 lamps, multiply by 1.25 to find the required number of units.

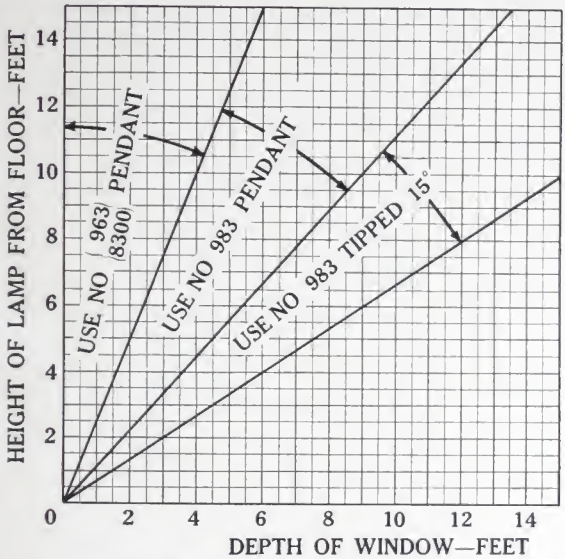

Fig. 21. Chart for determining the proper Holophane reflector to use for window lighting.

To Determine the Proper Type of Reflector.

Place the point of a pencil on the number in the chart (bottom scale) which corresponds with the **depth** of your window. Follow the vertical line upward until it strikes the horizontal line corresponding with the height of the window (scale at left). Choose the reflector indicated for the point where these two lines meet.

Example. If a window is 6 feet deep and 10 feet high the vertical and horizontal line would meet within the area indicating the use of 983.

Window Lighting Reflectors—Dimensions and Prices.

Holophane No.	Dimensions in Inches			Recommended Type C Lamp Watts	Number in Standard Package	Approx. Shipping Weight Standard Pkg.	†Net Packing Charge for Standard Pkg.	List Price Each
	Diameter	Height	*Holder					
983	10 3/8	6 1/2	2 1/4 H	100	15	65	$.60	**$1.65**
963	10 1/2	5 1/4	2 1/4 H	100	15	65	.60	**1.65**
8300	10 5/8	5 3/8	2 1/4 H	100	15	65	.60	**1.65**

* It is imperative that proper holders be used with Holophane Glassware.

† Packing on orders for other than standard package quantities will be charged extra, at cost.

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HOLOPHANE NOMOGRAM

FOR CALCULATING DESIRED ILLUMINATION

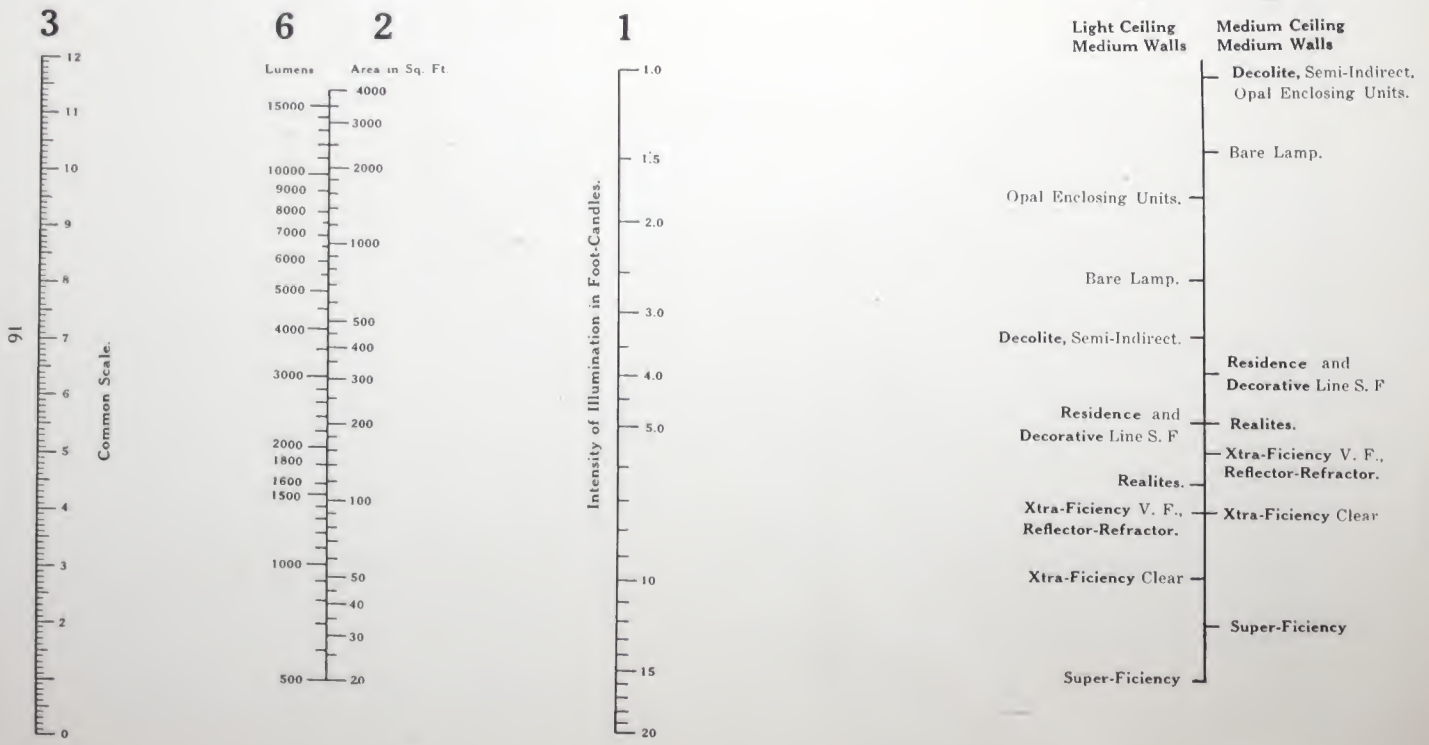


TABLE I. Horizontal Intensities Required for Different Locations in Foot-Candles.

Armory	2.5	Operating Room	15.0	Saloon	3.5
Auditorium	2.0	Corridor	1.0	School	
Auto Showroom	4.5	Hotel		Class Rooms	3.5
Bank (General)	2.5	Bedroom	3.0	Corridors	1.5
Bank (Desk)	5.5	Corridor	1.0	Drawing Rooms	5.5
Barber Shop	4.5	Dining Room (Gen).	3.5	Store	
Billiard Room (General)	1.2	Lobby	3.5	Clothing	6.0
Billiard Table	8.5	Library		Dry Goods	6.0
Cafe (General)	3.5	Stack Room	2.0	Furniture	5.0
Cafe (Table Lamps)	2.0	Reading Room	4.0	Grocery	3.5
Card Room	3.0	Reading Room, with local	1.5	Hardware	4.5
Church	3.0	Museum	3.0	Jewelry	5.5
Drafting Room	9.0	Office		Millinery	5.5
Desk	5.5	Small	4.0	Shoe	3.5
Engraving	11.0	Large (General)	4.5	Stationery	3.5
Factory		Large, with local	2.0	Tobacco	3.5
General—no local	4.5	Residence		Show Window	
General—with local	2.0	Hall	1.0	Light Goods	14.0
Local (fine work)	8.0	Parlor	2.5	Dark Goods	22.0
Local (coarse work)	4.5	Living Room	2.5	Theatre	
Garage	3.0	Library	2.5	Auditorium	2.5
Gymnasium	3.5	Dining Room	2.5	Moving Picture (dim)	0.3
Hospital		Kitchen	3.0	Moving Picture (bright)	2.0
Ward Room (Dim)	0.3	Laundry	2.5	Warehouse	1.0
Ward Room (Bright)	3.0	Bed-Room	2.0		
		Bath-Room	3.0		

TABLE II. Lamp Ratings Total Lumens Output as of July 1, 1916.

Lamp rating in watts 105-125V	Total lamp flux in lumens
MAZDA "B" LAMPS	
10	75
15	128
20	178
25	234
40	380
50	480
60	590
100	1030
MAZDA "C" LAMPS	
75	865
100	1260
200	2800
300	4600
400	6150
500	8050
750	12800
1000	18000

TABLE III. Spacing Constants for Holophane Units. Spacing Distance =K x Mounting Height.

Type	K
CSE	2.00
CSI	1.25
XE	2.00
XI	1.25
XF	.75
Concentrating	.60
Realite	1.40
Reflector-Refractor	2.00
Decolite	4.00

Directions For Using Holophane Nomogram

Determine area of space to be lighted by multiplying length in feet by width in feet.

Find the required horizontal intensity from Table I.

Locate this "required intensity" on scale 1.

Locate "area to be lighted" on scale 2.

Place straight edge (ruler, edge of letter paper) across points on 1 and 2 and note where it crosses scale 3.

Locate type of unit desired on either scale 4 or 5 depending on wall and ceiling conditions. Connect this point with point found on 3. The intersection with scale 6 gives the number of lumens that must be provided.

Dividing the number of lumens by number of outlets gives the lumens output for each lamp. Find size of corresponding lamp in Table II.

The spacing distance (average) is found by multiplying the distance unit is above plane to be lighted by constant "K" in Table III. For Decolites multiply by distance unit is below ceiling.

All figures in the above tables are based on either actual illumination or actual photometric tests, and can be relied upon to give correct results for average conditions.

Fig. 22. Holophane 2110 light the entire floor space without glare at a minimum cost.

SEMI-ENCLOSING UNITS.

Reflector-Refractors.

Shortly after the advent of the Type C lamp many shapes of opal glass enclosing units appeared, but while several of them gave good diffusion, the best proved extremely wasteful, first, due to the great amount of light absorbed by the glass, and second because they allowed the light to spread in all directions. The problem was not only to eliminate glare but to redirect the light properly in useful directions.

Recognizing the inefficiency of such units, Holophane engineers designed a line of enclosing units known as Reflector-Refractors which, so to speak, harness the tremendous illuminating power of the Type C lamp in a way that compels it to yield a maximum of illuminating efficiency

Fig. 23. The Reflector-Refractor unit No. 2110 V.F. is 7⅜ in. in diameter and No. 2120 V.F. is 9½ in. in diameter. These are designed for the 100 and 200-watt type C lamps respectively.

The Reflector-Refractor, as shown in the accompanying illustration, combines a highly efficient Holophane Reflector (upper section) and a perfectly designed Refractor (lower section). The Reflector gathers from the filament practically all of the

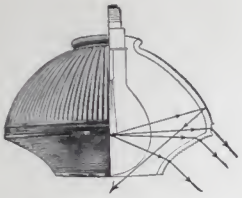


Fig. 23A. Diagram showing the action of the Reflector-Refractor unit. A large part of the light from the upper or reflector surface passes out through the opening at the bottom. The direct light from the lamp below the horizontal is caught by the lower or refractor portion and thrown down at approximately 45 degrees. This lower band acts as a screen as well as a refractor.

available light from an upward direction, and because of the reflecting power of the scientifically designed "stiletto" prisms, throws it downward. A certain amount of light thus reflected passes out through the opening at the lower part of the unit.

The larger proportion, however, both from the walls of the Reflector and direct from the light source, is sent downward to the lower or Refractor section of the unit, the prisms of which are so designed as to redirect the light downwardly and outwardly, at an angle of about 45 degrees from the horizontal.

The Refractor shields the eye from the filament, while the unit as a whole is constructed in a way which permits the eye to perceive only a perfectly diffused, glareless light from all normal angles of vision. The inside velvet finish, described on page 5 aids materially in softening the light without injury to its illuminating power.

By a special process the Reflector and Refractor in the smaller units are tightly fused, making an absolutely safe one-piece unit of elegant and compact appearance. The aperture in the Refractor permits easy renewal of the lamp, yet its small size, together with the slanting walls serves to prevent the collection of dust and insects, so often found in enclosing units with resultant unsightly appearance and loss of efficiency. Furthermore, with the Reflector-Refractor the white light of the bare lamp remains unchanged, a big advantage over other globes in which the light is given a yellowish hue.

Where To Use Holophane Reflector-Refractors

Schools

This unit is ideal for use in Schools, where high efficiency and absolute protection from glare are essential. It provides a light of great power which is definitely directed on the working plane.

Stores

For the proper display of goods the maximum of light should be thrown downward, but at the same time there should be general diffusion. Appearance is also an important factor in any store lighting unit, particularly in connection with the lighting of mezzanine floors and balconies, where low ceilings bring the unit well within the range of vision. These requirements are not fully and

Fig. 24. Suggestion for using the Reflector-Refractor unit No. 2110 on a wall bracket.

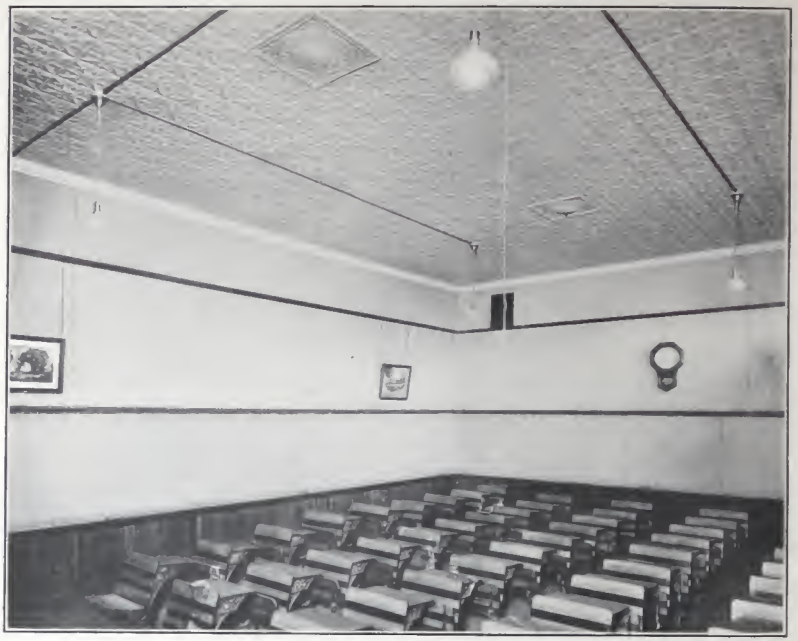


Fig. 25. Reflector-Refractors meet the very important schoolroom requirement of ample light without glare.

satisfactorily met in any other unit outside of the Reflector-Refractor. It lights the goods brightly but not brilliantly--without creating the dark shadows invariably thrown by units of poor diffusing quality. A store lighted by this unit is bathed in a soft pleasant glow of light that is agreeable to the customer and kind to the eyes of the employee. Lastly, the Reflector-Refractor is neat and attractive in appearance—its clean-cut design harmonizes with any architectural plan.

Other Uses.

This unit is so universal in its adaptability that to name its every use would necessitate a long list of installations. It is particularly appropriate for offices, libraries, public buildings, show rooms and corridors, inside dining room domes, table lamps, etc.

How to Use Reflector-Refractors.

As demonstrated by the distribution curve illustrated by Figure 27, these units distribute the light over a large area. In calculating lighting installations the chart on page 29 should be consulted, using the data for the "extensive type."

How to Determine the Number of Outlets.

For this consult the Holophane Nomogram, page 16. Use the same data for Reflector-Refractor as for the Xtra-ficiency line velvet finish for Type C lamps, thus obtaining the maximum efficiency.

Fig. 26. An attractive moving picture theatre entrance. The usual glare from bare lamps has been removed by using Holophane 2110 Reflector-Refractors.

No. 2130, unlike 2110 and 2120 which are in one piece, is a two-piece unit held together mechanically by a simple and entirely safe metal clamp arrangement. It is desirable to install this unit with a 4 inch hood No. 0653, which includes also a Mogul socket, insuring the correct position of the lamp, and therefore maximum efficiency. When used with the 200-watt lamp an adapter should be screwed into the Mogul socket.

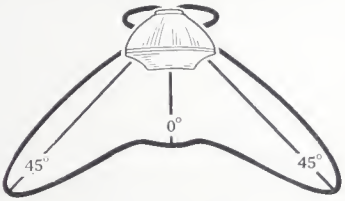


Fig. 27. Typical distribution curve of the Reflector-Refractor units. Note that these belong to the extensive type.

Fig. No. 28. No. 02760 V. F. This includes 2130 Reflector-Refractor and hood No. 0653 with Mogul socket.

In order to facilitate the sale of Holophane Reflector-Refractors we have standardized on a line of complete fixtures of neat appearance, which include, beside the glassware, the canopy, chain, socket and holder not wired. The prices of these complete fixtures as given on page 23 are extremely low, and should enable you to make quick sales where initial cost is a consideration.

Fig. 29. An example of efficient lighting in an office furniture salesroom, with Holophane 2120 Reflector-Refractors.

Holders for Reflector-Refractor Units

For 75 Watt Lamp use 2¼ in. Form O Holder
For 100 Watt Lamp use 2¼ in. Form H Holder

For 100 Watt Lamp use 3¼ in. Form O Holder
For 200 Watt Lamp use 3¼ in. Form A Holder

For 200 Watt Lamp use 4 in. Hood 0653 with adapter
For 300 or 400 Watt Lamp use 4 in. Hood 0653

02700 V.F. 02710 V.F. 02720 V.F. 02740 V.F. 02730 V.F.

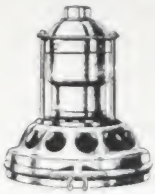
All fixture parts furnished in brush brass unless otherwise specified. Any desired finish will be supplied at extra cost. Standard length of fixture approximately 36 in. For high ceilings, pendants of the proper length should be specified. Extra links furnished at 15c net, per running foot.

Reflector-Refractors—Dimensions and Prices.

Holophane No.	Dimensions in Inches			Recommended Type C Bowl Frosted Lamp Watts	Number in Standard Package	Approx. Shipping Weight Standard Pkg.	†Net Packing Charge for Standard Pkg.	List Price Each
	Diam. Glass	Length over-all	*Holder					
2110 V.F.	7 3/8	4 7/8	2 1/4 O	75	20	68	$0.60	**$2.10**
2110 V.F.	7 3/8	4 7/8	2 1/4 H	100	20	68	.60	**2.10**
2120 V.F.	9 1/2	6 1/4	3 1/4 O	100	12	76	.60	**4.50**
2120 V.F.	9 1/2	6 1/4	3 1/4 A	200	12	76	.60	**4.50**
2130 V.F.	12 1/4	8 1/4	4 spec.	300-400§	4	63	.60	**10.50**
02760 V.F.	12 1/4	12 1/4	4 spec.	300-400§	4	72	.60	**15.00**
02700 V.F.	7 3/8	33 3/4	2 1/4 O	75	15	90	.60	**7.60**
02710 V.F.	7 3/8	34 5/8	2 1/4 H	100	15	90	.60	**7.80**
02720 V.F.	9 1/2	35 7/8	3 1/4 A	200	8	72	.60	**9.50**
02730 V.F.	12 1/4	37 3/4	4 spec.	300-400§	3	64	.60	**17.50**
02740 V.F.	9 1/2	35	3 1/4 O	100	8	72	.60	**9.30**

* It is imperative that proper holders be used with Holophane Glassware.
† Packing on orders for other than standard package quantities will be charged extra, at cost.
§ Can be used with 500-watt type C lamp.
Shipments—F.O.B. Newark, Ohio.

Holders for Holophane Glass Reflectors



Form A Holder

Form H Holder

Form O Holder

Fig. 32. Holders for Holophane Reflectors.

NOTE: It is imperative that the proper holders be used with Holophane Glassware. Any deviation from specifications changes the relative position of the light source and the reflecting surface, with consequent unsatisfactory results.

Holders—Dimensions and Prices

Hol. No.	List Price Each	Packing	Diameter Inches	*Finish
Form A Holder	$0.60	Holders	3¼	Polished or Brush Brass
Form H Holder	.40	packed as	2¼	Polished or Brush Brass
Form O Holder	.25	ordered.	2¼	Polished or Brush Brass

* Polished brass holders will be shipped when finish is not specified.
Shipments—F.O.B. Newark, Ohio.

ENCLOSING UNITS.
Holophane No. 04500 S.B.

The same features which distinguish good from poor semi-enclosing units apply with equal force to totally enclosing units. An enclosing unit to be satisfactory must do more than simply diffuse the light emitted by the Type C lamp. It must provide the proper downward distribution.

(For prices see page 26.)

Fig. 33. Holophane No. 04500.

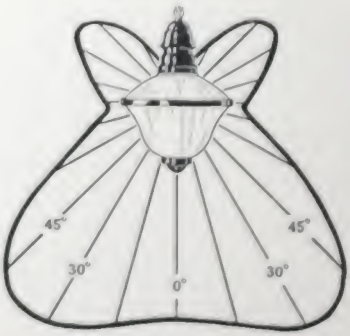


Fig. 34. Typical light distribution of unit 04500 S. B.

Fig. 35. The last word in school architecture embodies Holophane scientific illumination throughout. This auditorium lighted by Realites.

In addition it must have minimum absorption, in order not to waste light. Combined with these three things, it must embody good looks.

You need not hesitate to make the statement that the Holophane are the only enclosing units which combine all of the above features.

Fig. 36. Nos. 02560 V. S., 02570 V. S., 06260 V. S. and 06290 V. S.

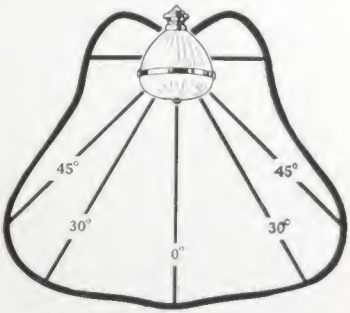


Fig. 37. Typical light distribution of the Holophane Realite, 02560 V.F. etc.

HOLOPHANE REALITES.

Realite units are made in two sections locked together by a strong metal band. The upper section of Holophane prismatic glass, reflects the light to the etched bowl below, whence it is broadly diffused—a maximum of non-glaring illumination distributed on the desired plane.

Where to Use Realites.

Realites are designed essentially for interiors of unusually large dimensions, especially when the ceilings are high and the outlets are spaced at considerable distances. They are particularly adapted to armories, auditoriums, department stores, gymnasiums, libraries, offices, railroad stations and terminals, schools, etc.

For determining location of outlets use Nomogram page 16.

Enclosing Units—Dimensions and Prices

Holophane No.	Description	Dimensions in Inches: Diam.	Depth	Fitter	Recommended Type C Lamp Watts	Number in Standard Package	Approx. Shipping Weight Standard Pkg.	§Net Packing Charge for Standard Pkg.	List Price Each
04500 S.B.	**Complete fixture with glass**	10¼	28	*2¼	100	6	75	.60	$10.00
6710	Clear Glass Reflector	10†	3¼	*2¼	100	30	88	.60	1.20
4402 S.F.	Satin Finish Bowl..	10†	5½	...	100	20	82	.60	2.30
0450	Fixture	...	...	...	...	..	..	..	6.50

* Special.
† Diameter over all. Diameter under flange is 9½ inches.

HOLOPLANE REALITES

02560 V.S.	**Complete unit, Velvet Reflector and S.F. Bowl**	10⅝	15¼	3¼	100	4	70	.60	16.40
7550 V.F.	Velvet Finish Refl.	10	6⅝	3¼	100	10	70	.60	3.35
7530 S.F.	Satin Finish Bowl..	10	3⅛			10	55	.60	2.30
0256	Band, hd. with sock.	....	....	...	...	..	..	..	10.75
02570 V.S.	**Complete unit Vel. Reflector and S.F. Bowl**	12¾	16¼	3¼	1-200	3	72	.60	21.00
7552 V.F.	Vel. Finish Refl...	12	7⅜	3¼	1-200	5	65	.60	6.50
7532 S.F.	Satin Finish Bowl..	12	3⅜	...	....	10	70	.60	3.30
0257	Band, hd. with sock.	....	....	...	....	..	..	..	11.20
06260 V.S.	**Complete unit Vel. Reflector and Satin Finish Bowl**	17	20⅝	6	750 1000	1	67	.84	47.05
8263 V.F.	Vel. Finish Reflector	16	9	.	1000	3	72	.60	20.50
8463 S.F.	Satin Finish Bowl..	16	3⅜	.	....	6	79	.60	9.20
0626	Band and hood with socket	..	....	.	....	.	..	..	17.35
06290 V.S.	**Complete unit Vel. Reflector and S.F. Bowl**	14¾	17¾	4	3-4-500	2	70	.60	30.70
8242 V.F.	Vel. Finish Reflector	14	8	4	....	4	69	.60	11.00
8442 S.F.	Satin Finish Bowl..	14	3⅜	.	....	8	76	.60	5.90
0629	Band and hood with socket	....	....	.	....	.	..	..	12.90

Finish of Fixtures—Brushed Brass.
Packing on orders for other than standard package quantities will be charged at cost.
Shipments—F.O.B. Newark, Ohio.

Fig. 38. Main office of the New York World lighted throughout by Holophane Realities.

Fig. 39. New York sales office of the Goodrich Rubber Company lighted throughout by Holophane Realites.

The Effect of Dust on Holophane

Competitors use the argument that Holophane prisms collect dust and cause a big decrease in the efficiency of the unit.

All units collect dust, but the surfaces of Holophane reflectors collecting the most are those whose chief value lies in reflecting the light —not in transmitting it. As their reflecting ability remains practically unchanged, dust or no dust, the objection of the Holophane competitors carries little weight.

A comparison of Holophane with the light-density Opal on the chart herewith, based on actual installation tests, shows a greater loss of life in the case of Opal.

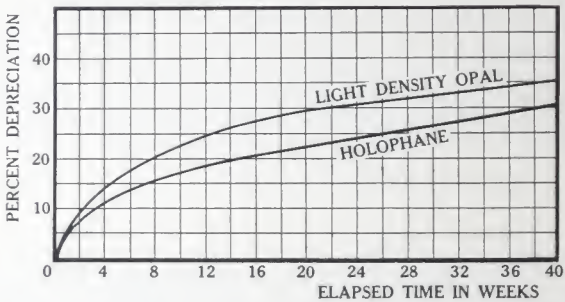


Fig. 40. Curve showing the effect of dust on the efficiency of light density opal and Holophane reflectors. Note that the depreciation is greater with opal than with Holophane and that if the Holophane reflectors are cleaned at reasonable intervals the loss from dust is slight.

The important fact to be considered, in connection with the dust question, is that any lighting medium is affected by dust and dirt. Tests have shown that the loss from dirt on the lamp bulb may be greater than from dirt on the reflector. The average individual will have his windows cleaned to let in more daylight many times before he thinks of cleaning his lighting units. Yet daylight is free and artificial light costs money.

Although the efficiency of Holophane units is not materially affected by a moderate amount of dust, users should be educated to keep them clean by washing at regular intervals. It is only logical that a unit which has been scientifically developed to the highest point of light conservation should receive the attention necessary to keep it working at full power.

Holophane units are easily cleaned either by dusting with a stiff brush or by dipping in water to which has been added nitric acid in the proportion of 1 ounce of acid to the gallon of water. After washing, the reflectors sparkle and have the same efficiency as when new.

DIRECTIONS FOR USING SPACING CHART No. 41

IF RECEPTACLES ARE ALREADY LOCATED AS TO SPACING AND MOUNTING HEIGHT

To Determine Type of Reflector

To determine the proper type of reflector, find height of receptacle above floor. Locate this height on vertical scale on left. Follow over on the horizontal line. Find distance apart or spacing of receptacles. Locating this on the bottom scale, follow up vertical line until it intersects horizontal line first found. Their intersection determines the type to be used.

IF OUTLETS ARE SPACED ONLY

To Determine Mounting Height.

First, assume intensive type reflector. Locate spacing in feet and follow up on vertical line until it intersects "intensive" reflector line. Follow horizontal line to left, determining height above floor. If this height is too great for case in question, assume "extensive" type reflector and proceed as before.

EXAMPLE 1.

Room 20x30 ft., four outlets. 15 ft. apart one way, 10 ft. apart the other, average 12½ ft. Height of receptacle above floor, 10 ft. Locate 10 ft. on left hand vertical scale and follow over on horizontal line. Locate 12½ ft. on bottom scale and follow up vertical line. They intersect in area "use reflector CSI".

EXAMPLE 2.

In the same size room, assume that it has a height of 9 ft. We will assume the 12½ ft. average spacing, follow up to "intensive" line. From this point, follow horizontal line to left, and find that the ideal mounting height is 12½ ft. This, we find is too high for the room. We then go back to the average spacing, 12½ ft., and follow up to "extensive" line. From this point, following horizontal line to left, we find mounting height should be 8¾ ft. With a receptacle directly on the ceiling, the CSE can be used very advantageously.

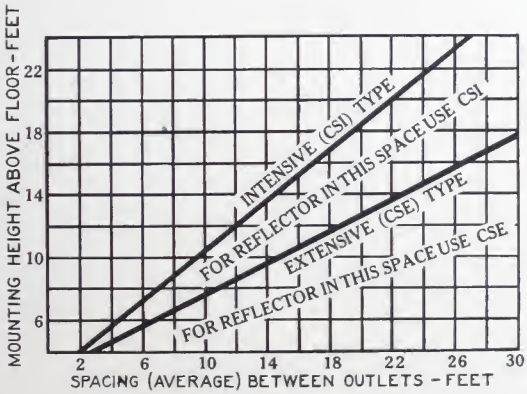
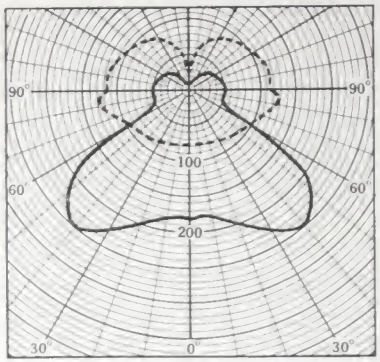
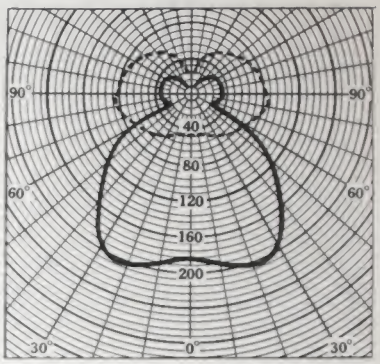


Fig. 41. Chart for finding the proper spacing and mounting heights for Holophane Super-ficiency reflectors.



CSE-100 V.F.

Distribution of light, in the vertical plane, of the Holophane Reflector CSE-100 V.F. with 100-watt clear, type C lamp, operated at 1260 lumens. Holder form "H." Output of Reflector in lumens: 0-60 degrees, 679; 0-90, 844; 90-180, 231; 0-180, 1075.

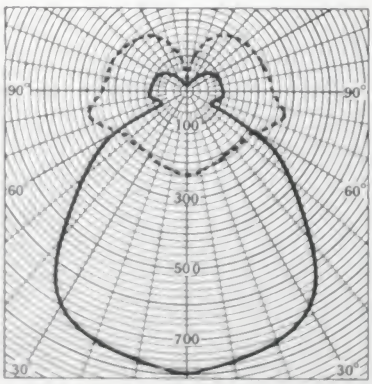


CS1-75 V.F.

Distribution of light in a vertical plane, of Holophane Reflector CS1-75 V.F. with 75-watt clear, type C lamp, operated at 865 lumens. Holder form "O." Output of Reflector in lumens: 0-60 degrees, 471; 0-90, 571; 90-180, 174; 0-180, 745.

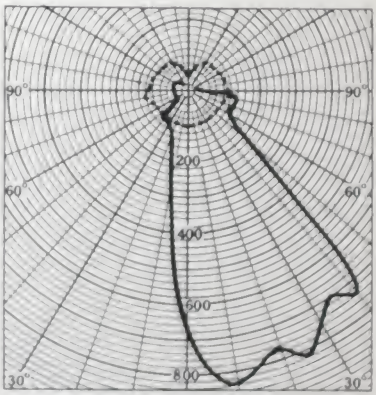
———— Lamp With Holophane Unit

— — — — Lamp Alone



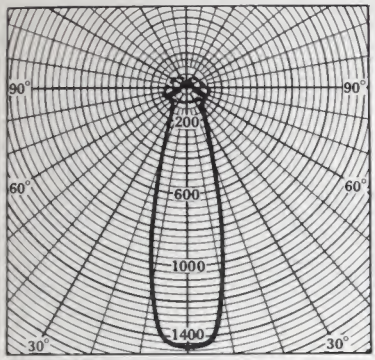
CS1-200 V.F.

Distribution of light in a vertical plane, of Holophane Reflector CS1-200 V.F. with 200-watt clear, type C lamp, operated at 2791 lumens. Holder form "A." Output of Reflector in lumens: 0-60 degrees, 1662; 0-90, 1955; 90-180, 477; 0-180, 2432.



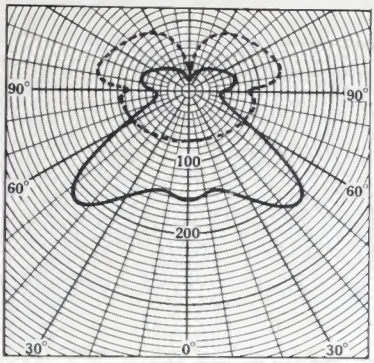
No. 983

Distribution of light in the main vertical plane (assymmetrical) of Holophane No. 983 Window Lighting Reflector with 100-watt clear, type C lamp, operated at 1257 lumens. Holder form "H."



No. 963.

Distribution of light, in a vertical plane (symmetrical) Reflector No. 963 with 100-watt, clear, type C lamp, operated at 1257 lumens. Holder form "H." Output of Unit in lumens: 0-30 degrees, 450; 0-60, 730; 0-90, 955; 90-180, 163; 0-180, 1118.

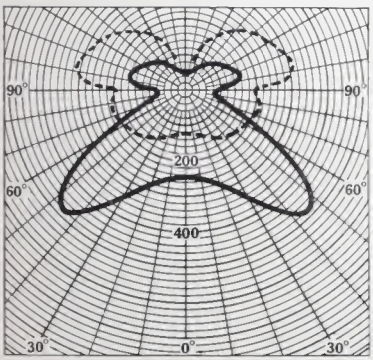


No. 2110 V.F.

Distribution of light in a vertical plane, of Holophane Reflector-Refractor No. 2110 V.F. with 100-watt, bowl frosted, type C lamp, operated at 1257 lumens clear lamp rating. Holder form "H." Output of Unit in lumens: 0-60 degrees, 562; 0-90, 742; 90-180, 328; 0-180, 1070.

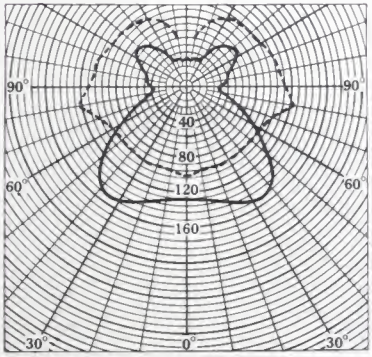
———— Lamp With Holophane Unit

— — — — Lamp Alone



No. 2120 V.F.

Distribution of light, in a vertical plane, of Reflector-Refractor No. 2120 V.F. with 200-watt, bowl frosted, type C lamp, operated at 2791 lumens, bare lamp rating. Holder Form "A." Output of Unit in lumens: 0-60 degrees, 1211; 0-90, 1589; 90-180, 749; 0-180, 2338.



No. 04500 S.B.

Distribution of light, in a vertical plane, of Holophane Unit No. 04500 S. B. with 100-watt, clear, type C lamp, operated at 1257 lumens. Holder special 2¼ inches. Output of Unit in lumens: 0-60 degrees, 413; 60-90, 163; 90-180, 330; 0-180, 960.

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